ABSTRACT

An FFT correlation tracker that is capable of effectively tracking targets against non-uniform backgrounds in realtime, includes a background correction implemented using a FFT with the 2-dimension sinc function. The tracker tracks an object by effectively computing the first and third terms of the mean-square-error function $C(s,t)$ defined as

$$C(s,t) = \frac{1}{N}\sum_{N} f^2(x,y) + \frac{1}{N}\sum_{N} g^2(x-s,y-t) - 2\cdot\frac{1}{N}\sum_{N}[f(x,y)\cdot g(x-s,y-t)]$$

This is done by first transforming the first and third terms into the frequency domain, where the first term, the background correction term, can be computed much more efficiently in real-time by using the 2-dimension sinc function. Multiplications and additions necessary to carry out the computations in the frequency domain are then performed. Next, the resulting frequency-domain function is transformed back into the spatial domain to form a correlation surface. Finally, a minimum of the resulting correlation surface is found. The location of the minimum corresponds to the location of the object being tracked.